

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (previously presented): A self-doping type electrically conducting polymer comprising crosslinked polymer chains, wherein the crosslinking is formed through a sulfone bond and the polymer contains an isothianaphthene skeleton having a sulfonic acid group.

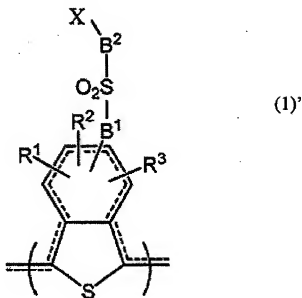
2. (canceled).

3. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein the sulfone bond is contained in an amount of from 1 to 90 mol% based on the repeating unit of the polymer.

4. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein the polymer chains are crosslinked through a bond having a binding energy from 0.5 to 2 eV lower than the binding energy of the sulfonic acid group as measured by X-ray photoelectron spectrometry.

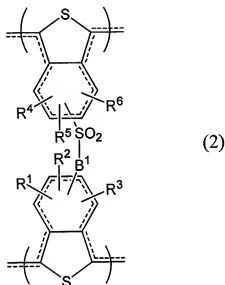
5. (canceled).

6. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein the crosslinked structure through a sulfone bond is an isothianaphthene structure represented by formula (1)'



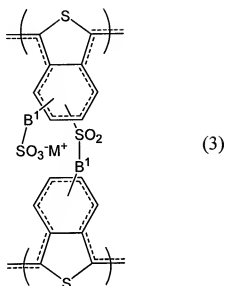
wherein R<sup>1</sup> to R<sup>3</sup> each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a -B<sup>1</sup>-SO<sub>3</sub><sup>-</sup>M<sup>+</sup> group, B<sup>1</sup> and B<sup>2</sup> each independently represents - (CH<sub>2</sub>)<sub>p</sub>- (O)<sub>q</sub>- (CH<sub>2</sub>)<sub>r</sub>-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, X represents a polymer chain selected from the group consisting of a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure which bonds to B<sup>2</sup> via an aromatic ring or a heterocyclic ring contained in the polymer chain, and M<sup>+</sup> represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

7. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (2):



wherein  $R^1$  to  $R^6$  each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a  $-B^1-SO_3^+M^+$  group,  $B^1$  represents  $-(CH_2)_p-$   $-(O)_q-$   $-(CH_2)_r-$ ,  $p$  and  $r$  each independently represents 0 or an integer of 1 to 3,  $q$  represents 0 or 1, and  $M^+$  represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

8. (original): The self-doping type electrically conducting polymer as claimed in claim 7, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (3)

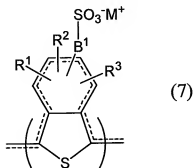


wherein B<sup>1</sup> represents - (CH<sub>2</sub>)<sub>p</sub> - (O)<sub>q</sub> - (CH<sub>2</sub>)<sub>r</sub>-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M<sup>+</sup> represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

9. (canceled).

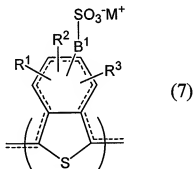
10.-12. (canceled).

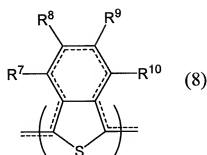
13. (original): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (2) described in claim 7, comprising dehydration-condensing self-doping type electrically conducting polymers having a structure represented by formula (7)



wherein  $R^1$  to  $R^3$  each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a  $-B^1-SO_3^-M^+$  group, with the proviso that at least one of  $R^1$  to  $R^3$  is a hydrogen atom,  $B^1$  represents  $-(CH_2)_p-(O)_q-(CH_2)_r$ ,  $p$  and  $r$  each independently represents 0 or an integer of 1 to 3,  $q$  represents 0 or 1, and  $M^+$  represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

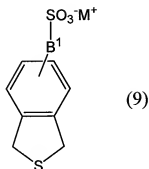
14. (original): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (2) described in claim 7, comprising dehydration-condensing self-doping type electrically conducting polymers having a structure represented by formula (7) and/or formula (8):





wherein  $R^1$  to  $R^3$  and  $R^7$  to  $R^{10}$  each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a  $-B^1-SO_3^+M^+$  group, with the proviso that at least one of  $R^7$  to  $R^{10}$  is a hydrogen atom,  $B^1$  represents  $-(CH_2)_p-(O)_q-(CH_2)_r$ ,  $p$  and  $r$  each independently represents 0 or an integer of 1 to 3,  $q$  represents 0 or 1, and  $M^+$  represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

15. (original): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (3) described in claim 8, comprising dehydration-condensing self-doping type electrically conducting polymers obtained by (co)polymerizing a monomer represented by formula (9):



wherein B<sup>1</sup> represents - (CH<sub>2</sub>)<sub>p</sub> - (O)<sub>q</sub> - (CH<sub>2</sub>)<sub>r</sub>, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M<sup>+</sup> represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

16. (previously presented): The process for producing a self-doping type electrically conducting polymer as claimed in claim 13, wherein the dehydration condensation reaction is performed by a heat treatment at a temperature range of 210 to 350°C.

17. -18. (canceled).

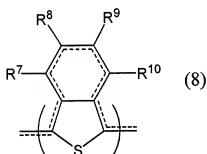
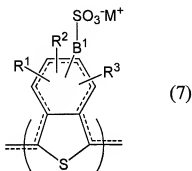
19. (previously presented): A self-doping type electrically conducting polymer obtained by the production process described in claim 13.

20. (previously presented): An electrically conducting composition comprising the self-doping type electrically conducting polymer described in claim 1, and a solvent.

21. (original): A method for producing an electrically conducting film, comprising coating the electrically conducting composition described in claim 20 on a substrate and heating it.

22. (previously presented): The method for producing an electrically conducting film as claimed in claim 21, wherein the self-doping type electrically conducting polymer having a

structure represented by formula (7) and/or formula (8) is applied onto a substrate surface and then the substrate is heated at a temperature of 210 to 350°C for 1 to 600 seconds,



wherein R<sup>1</sup> to R<sup>3</sup> and R<sup>7</sup> to R<sup>10</sup> each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a -B<sup>1</sup>-SO<sub>3</sub>M<sup>+</sup> group, with the proviso that at least one of R<sup>7</sup> to R<sup>10</sup> is a hydrogen atom, B<sup>1</sup> represents - (CH<sub>2</sub>)<sub>p</sub> - (O)<sub>q</sub> - (CH<sub>2</sub>)<sub>r</sub>, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M<sup>+</sup> represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

23. (canceled).

24. (previously presented): An electrically conducting film produced by the method described in claim 21.

25. (original): The electrically conducting film as described in claim 24, wherein the film thickness is from 1 to 1,000 nm.

26. (previously presented): A coated product comprising a shaped body having coated on the surface thereof the self-doping type electrically conducting polymer described in claim 1.

27. (previously presented): A coated product comprising a substrate as a shaped body, wherein one surface, both surfaces or the entire surface of the substrate is coated with the self-doping type electrically conducting polymer described in claim 1.

28. (original): A coated product comprising a substrate as a shaped body, wherein one surface, both surfaces or the entire surface of the substrate is coated with the electrically conducting composition described in claim 20.

29. (previously presented): The coated product as claimed in claim 27, wherein the substrate is a silicon wafer.

30. (previously presented): The coated product as claimed in claim 27, wherein the substrate is entirely or partially coated with indium tin oxide.

31. (previously presented): An electronic device comprising the self-doping type electrically conducting polymer described in claim 1.

32. (original): An electronic device comprising the electrically conducting composition described in claim 20.

33. (previously presented): An organic light-emitting element comprising at least one light-emitting layer between a pair of anode and cathode, wherein the self-doping type electrically conducting polymer described in claim 1 is contained in the anode buffer layer.

34. (original): The organic light-emitting element as claimed in claim 33, wherein the self-doping type electrically conducting polymer has a sulfonic acid group.

35. (previously presented): The organic light-emitting element as claimed in claim 33, wherein the self-doping type electrically conducting polymers are crosslinked through a sulfone bond.

36. (previously presented): An organic light-emitting element comprising the self-doping type electrically conducting polymer described in claim 1.

37. (original): An organic light-emitting element comprising the electrically conducting composition described in claim 20.

38. (original): The organic light-emitting element as claimed in claim 33, wherein the light-emitting layer comprises a fluorescence-emitting polymer material.

39. (original): The organic light-emitting element as claimed in 33, wherein the light-emitting layer comprises a phosphorescence-emitting polymer material.

40. (previously presented): An organic EL display comprising the organic light-emitting element described in claim 33.

41. (original): A display device for portable terminals, comprising the organic EL display described in claim 40.

42. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein one of the crosslinked polymer chains contains an isothianaphthene skeleton having a sulfonic acid group and another of the crosslinked polymer chains is selected

from the group consisting of a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure.